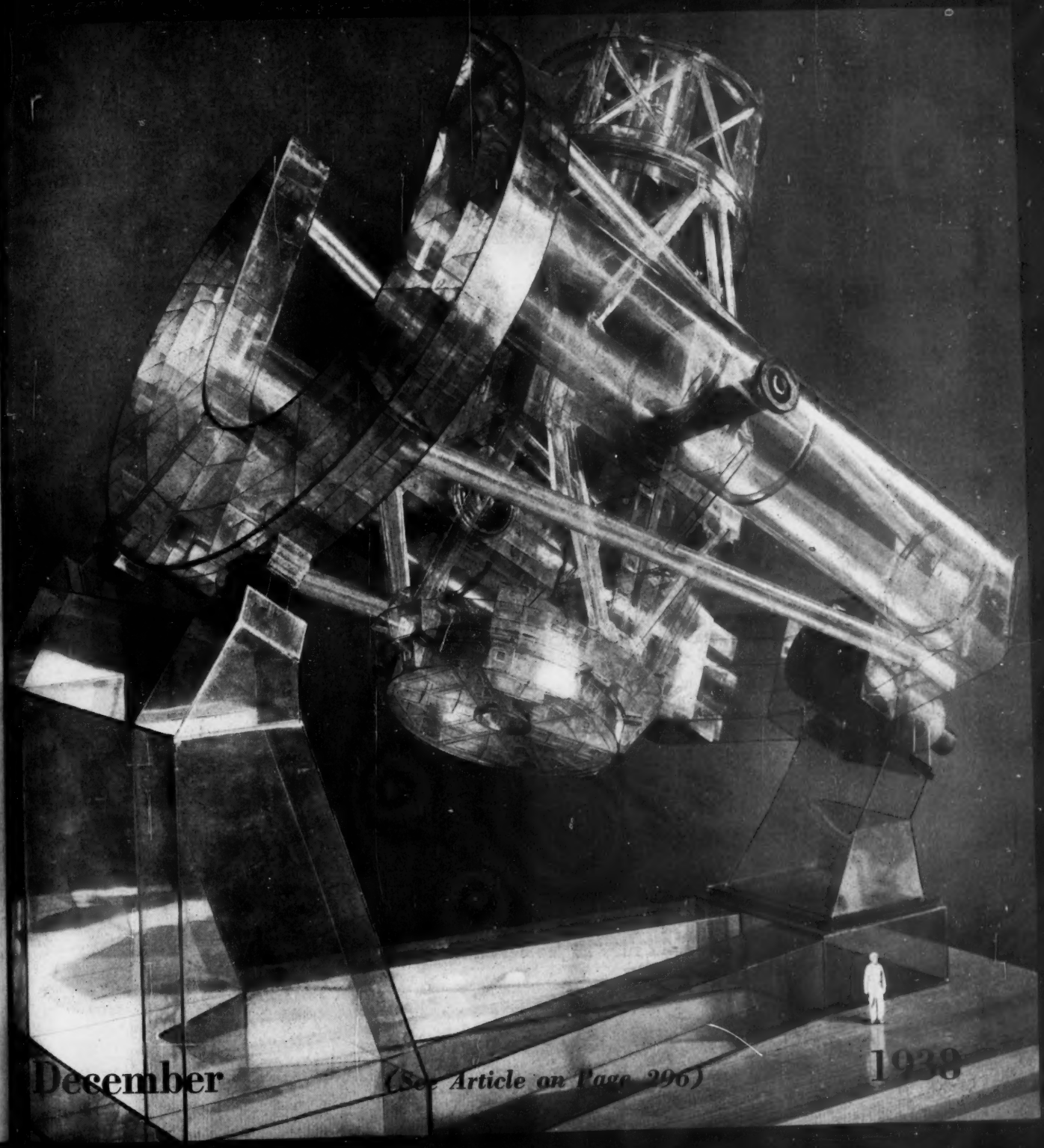
Industrial Standardization

and Commercial Standards Monthly



December 1939

(See Article on Page 296)

"The adoption of standards is a highly important factor in preparedness of our country for national defense. The value of the work of the American Standards Association in developing and establishing standards in industry is thoroughly appreciated."

—Louis Johnson, *Assistant Secretary of War*

INDUSTRIAL STANDARDS, which have become the keynote of our modern mass production methods, take on a new significance in time of flood, earthquake, war, or other national disaster.

After the recent hurricane, which in a few hours destroyed most of the telephone and telegraph communications from Westhampton, Long Island, to Worcester, Massachusetts, and north to Maine, the AT&T as a result of standardization was able to bring linesmen and equipment from as far west as Missouri to repair the damage.

General adoption of a standard screw thread for fire-hose couplings has done much to eliminate the heavy losses of life and property. In the Salem and Baltimore fires, apparatus from the nearby towns had to stand uselessly by while whole blocks went up in flames. Now in case of emergency the fire departments for miles around can send in apparatus which, equipped with standard hose couplings, is able to prevent the spread of conflagration, to pump out basements, and to clean streets.

After every recent flood, the existence of national standards has helped local industry and public services to get back to normal quickly. Where sewer pipe has been washed away, standard steel pipe is available from a score of sources instead of from a single manufacturer who may himself have been flooded out. Overhead trolley equipment, swept away, twisted, or broken beyond repair, can be ordered by a standard number designation. Replacement parts for tracks, frogs, and switches are all available in standard sizes and shapes. Standard ball or roller bearings, machine tool elements, gears, shafting, sprockets, etc.—all obtainable from stock existing in undamaged areas—help to start the wheels of a crippled local industry turning again.

Thus, the standards departments in so many American firms, the standardization programs of trade associations and technical societies, the work of nearly three thousand engineers and technical experts on American Standards Association committees, keep the mass production machine in running order and at the same time build up resources for our protection in time of national emergency.

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Industrial
Standardization

Combined with Commercial Standards Monthly

Published Monthly by

American Standards Association
29 West 39th Street, New York

with the cooperation of the National Bureau of Standards

RUTH E. MASON, *Editor*

This Issue

***Our Front Cover:** This small model made of transparent plastic material was used by Westinghouse engineers in checking their calculations of the huge mounting for the 200-inch Mt. Palomar telescope. The man's figure is drawn to scale. Courtesy Westinghouse Electric & Manufacturing Company.*

ASA

Standardization is dynamic, not static. It means not to stand still, but to move forward together.

Subscription price $4.00 per year U. S. and Canada (foreign $5.00); Special to schools and libraries $2.00 (foreign $3.00); single copies 35 cents

December, 1938 **Vol. 9, No. 12**

Edmund A. Prentis
President

R. E. Zimmerman
Vice-President

New ASA Officers Elected at Annual Meeting

AT an Annual Meeting attended by 154 representatives of Member-Bodies, Associate Members, and Company Members of the American Standards Association, the election of new officers for the year 1939 was announced.

Edmund A. Prentis, secretary and chief engineer of Spencer, White & Prentis, engineers and contractors, was elected president. Mr. Prentis is an expert on building foundations, and is co-author of "Underpinnings" published by the Columbia University Press. He is a trustee of Columbia University. His firm is now engaged in building a section, known as Route 101, Section 6, of the new Sixth Avenue Subway in New York City.

Mr. Prentis has been active in the work of the ASA for several years, and has been a member of the Board of Directors, nominated by the American Society of Civil Engineers, since 1935. Mr. Prentis succeeds Dana D. Barnum who has been president of the ASA for three years.

R. E. Zimmerman, vice-president of the United States Steel Corporation, was elected new ASA vice-president. He has been a member of the Board of Directors since 1937, when he was nominated for membership by the American Iron and Steel Institute. Mr. Zimmerman is well-known both in industrial and educational circles. He is a member of the Metallurgical Advisory Board; the Carnegie Institute of Technology; Trustee of Hood College; and Member of the Corporation of the Massachusetts Institute of Technology.

F. M. Farmer, who was re-elected chairman of the Standards Council, in charge of the standardization activities of the ASA, is vice-president of the Electrical Testing Laboratories, New York. Mr. Farmer is also vice-president of the American Society of Electrical Engineers, and was recently elected chairman of the Engineering Foundation. He has been active for many years in different phases of ASA work, as a member of the Standards Council since 1934, and as a member of the Electrical Standards Committee, and of the United States National Committee of the International Electrotechnical Commission.

R. P. Anderson, re-elected vice-chairman of the Standards Council, has taken an outstanding part in developing standardization in the petroleum industry. He has been a member of the ASA standards Council since 1934, as a representative of

the American Petroleum Institute, and is secretary of the international standardization committee on petroleum.

Dana D. Barnum, retiring president of the ASA, was chairman for the Annual Meeting and welcomed the representatives of the new ASA Members on behalf of the Association. He also welcomed two guests who have had an important role in developing the Association's work—W. J. Serrill, first president of the ASA; and George B. Cortelyou, past chairman of the ASA Advisory Committee.

Mr. Cortelyou, the only man in this country who has occupied three cabinet offices, might almost be considered the father of the American Standards Association, Mr. Barnum said. He was connected with the Association from its inception, and has followed its activities with interest ever since. By unanimous vote of the ASA Board of Directors, Mr. Cortelyou has been elected the first and only Honorary Member of the American Standards Association, it was announced.

A rising vote of thanks was given to Mr. Barnum after C. L. Collens, National Electrical Manufacturers Association, expressed the warm appreciation of the members of the ASA for the ready service which Mr. Barnum had given during his term as ASA president. "Mr. Barnum has contributed unsparingly of his time and energy to the work of the Association and has actively promoted its interests, with the result that the membership of the Association has grown and the volume of work it is called upon to undertake has increased by leaps and bounds," Mr. Collens said.

The president's report, read by Mr. Barnum, and the report of the chairman of the Standards Council, read by Mr. Farmer, are published in full below.

The feature of the meeting was an address on "Management and the Public," by William L. Batt, president of the SKF Industries, page 292.

1938's Expanding Activities Intensify ASA Problems

by

Dana D. Barnum

Retiring President,
American Standards Association

Membership Increase of 25 Per Cent, Income Increase of 17 Per Cent, Still Fail to Keep Pace with Increase in Work Requirements

WHEN I assumed the presidency of the American Standards Association in 1936, the single greatest problem before the Association was one of finances. The greatest problem facing it today is still the financial one. This in spite of the fact that our income has increased 17 per cent and our membership 25 per cent. Unfortunately, or rather fortunately, the work brought to the Association by industry during that period has constantly grown faster than its income.

Two years ago on the occasion of the annual meeting, Mr. Cortelyou, whom you all know and who has for many years taken an active interest in the American Standards Association, said that he knew of hardly another organization that had worked within so limited a budget and accomplished such results. He referred to the completed work as impressive and as holding great promise for the future. Some of that promise has been realized notwithstanding the many difficulties in the way.

During the past three years many new opportunities for usefulness have come to the Association. It has brought together for the first time representatives of the great national consumer and retailer organizations in a comprehensive program for the development of standards for goods sold at retail. Important undertakings have already been start-

R. P. Anderson
Vice-Chairman, Standards Council

F. M. Farmer
Chairman, Standards Council

Standards Council Officers Re-Elected

ed and the program has unlimited possibilities.

Another field in which the Association is making a contribution to industry and the public is in the development of its building code work. A committee representing 20 national organizations has set to work on this problem of housing and construction which is one of the most important facing the country today. Fourteen projects are already under way and many organizations as well as governmental groups are participating in the work.

This period has also seen the beginnings of work for the prevention of occupational diseases. The Association is contributing to this work through the development of adequate standards for exhaust systems, and in the establishment of definite threshold limits beyond which the concentration in the air of particular toxic dusts, fumes, or gases, has proven to be a health hazard.

During the month of November another new industry committee, which will co-ordinate ASA work in the traffic field, held its organization meeting, bringing together 17 national organizations and government groups interested in safety standards for traffic, for highway construction, and for better functioning of car and driver.

In our international work, opportunities to further industrial relations abroad and with South American countries have come to us with the invitation to name a member on the Council of the International Standards Association. Very recently the American Chamber of Commerce in Buenos Aires has requested that the American Standards Association station an engineer in Argentina to promote the knowledge and use of American Standards in trade with South America. This is necessary not only to increase our proportion of South American trade but even to protect the trade that we now have.

One could go on at length: about the safety glass specifications that in two and a half years have been adopted by 24 states and the District of Columbia; about the standard for 16-millimeter sound film that has become a world standard; about the request from the Interstate Commerce Commission for work in connection with new regulations increasing safety of buses and trucks.

Obviously, the work of the American Standards Association has met with general approval.

Twenty years ago this October the American Standards Association was organized by industry for a definite purpose. It has today reached a point where it is providing services which industry cannot do without.

Let us look at the record:

We have twenty years of successful operation to our credit; we have methods that are tried and found good; we have acknowledgment by industry of the worth of our work; we have the confidence of industrial executives, regulatory bodies and enforcement officers; we have a well trained

and loyal staff (although too small). In fact, we have everything but money, and all these fine things we have worked and strived for will be as nothing unless industry gives us better support. Good wishes and sympathy are fine, but as they say down East, "there ain't no substitute for cash."

The Committee on Finance has done a fine job, as far as they could go, and we are in a better position than we were three years ago. Appeals have been made through thousands of letters, both circular and personal, but what we need is a well-informed and trained field secretary to "ride the sleepers" and sell this Association and its work to the leading industrialists of the country.

We have not had the money to do this in the past, but I sincerely hope it will be forthcoming in 1939, and when it is, I sincerely believe it will go a long way towards solving this all-important problem.

Before closing this report, I wish to pay tribute to the work of the Directors who have served on the Board during the past three years. It has been an inspiration to attend the meetings and find so much interest in the Association, and so much willingness of each to do his share of work in order to promote the welfare of the organization.

Of the Staff Members, I can only repeat the praise I have previously given them, and to say that the past year had added to my previous high regard for them.

To the new President and Vice President, I want to say that under their able guidance, I feel sure the future will show greater results than any we have accomplished in the past.

New Projects, National and International, Broaden Scope of ASA Standards Activities

Photography, highway traffic, plastering, toxic dusts and gases, and wires and cables are some of the important subjects on which the American Standards Association took action during the past year

by

F. M. Farmer[1]

Chairman, ASA Standards Council

DURING the past year the attention of the Standards Council has been almost entirely devoted to routine duties in connection with its normal functions of aiding in the development and establishment of American Standards.

A total of 21 new standards and 24 revisions of existing standards have been approved during this twelve month period. Eight new projects have been initiated.

Four of these new projects are under the Building Code Correlating Committee; namely, Design Loads, Reinforced Gypsum; Signs and Billboards; and Wood. Two other projects, the Building Exits Code, A9, and that on Grandstands, Z20, have been transferred to the Building Code Correlating Committee. These make a total of 14 projects in this field. Following a study by the Advisory Committee on Ultimate Consumer Goods, a new project on Standards for Bedding and Upholstery was initiated. This work is now actively going forward under the sponsorship of the National Association of Bedding and Upholstery Law Enforcement Officials.

One of the important new projects is Standardization in the Field of Photography including formulation of definitions, dimensional standards, recommended practices, establishment of methods of testing and rating of the performance characteristics of materials and devices used in photography, but excluding cinematography.

In response to the demand for standards dealing with the allowable concentrations of dust and gases in industrial establishments, the National

[1]Vice-president, Electrical Testing Laboratories, N. Y.

New Standards Approved Since Last Annual Meeting

Adjustable Adapters for Multiple Spindle Drilling Heads (B5.11-1937)
Specifications for Raw Linseed Oil (K34-1937)
Specifications for Boiled Linseed Oil (K35-1937)
Specifications for Bone Black (K36-1937)
Specifications for Chrome Oxide Green (K37-1937)
Specifications for Titanium Barium Pigment (K38-1937)
Specifications for Titanium Calcium Pigment (K39-1937)
Specifications for Titanium Dioxide (K40-1937)
Methods of Test for Specific Gravity of Pigments (K41-1937)
Methods of Test for Coarse Particles in Dry Pigments and Coarse Particles and Skins in Mixtures of Pigments and Vehicles (K42-1937)
Methods of Routine Analysis of Titanium Pigments (K43-1937)
Methods of Routine Analysis of Yellow, Orange, Red and Brown Pigments Containing Iron and Manganese (K44-1937)
Specifications for Metallic Coverings (C8.15-1938)
Specifications and Tests for Rubber Insulating Tape (C59.6-1938)
Recommended Practice in the Calibration of Microphones (Z24.4-1938))
Addendum to American Standard for Cast-Iron Long Turn Sprinkler Fittings (Screwed and Flanged) (B16g1-1937)
Specifications for Electrical Indicating Instruments (C39.1-1938)
Specifications for Gypsum Plastering, Including Requirements for Lathing (A42.1-1938)
Method for Designating the Size of Coal from Its Screen Analysis (M20.3-1938)
Time Series Charts (Z15.2-1938)
Specifications for Bare Concentric-Stranded Copper Cable for Insulated Conductors: Hard, Medium-Hard or Soft (C8.14-1938)

Revisions to bring 24 other standards up-to-date or to advance them from American Tentative Standard to American Standard were approved during the year.

Advisory Committee on Toxic Dusts and Gases established by the Council in 1935 as a purely advisory body, has recently been reorganized as a sectional committee to determine and establish allowable concentration limits of dusts and gases in industrial establishments from the viewpoint of occupational disease prevention.

A new industry supervising group, the Highway Traffic Standards Committee, has been organized to supervise standardization in the highway traffic field. Four projects previously under the jurisdiction of the Safety Code Correlating Committee are now definitely transferred to this new group which for the first time brings together all groups interested in motor, highway, and safety problems.

During the year an informal meeting of the Company Member Forum of the ASA has been held. This forum is being developed as a medium for the exchange of ideas on problems connected with standardization work in the industrial companies that are members of the ASA. The two meetings held so far have aroused considerable interest; and plans are under way for the future discussion in this Forum of such problems as the relationship of the standards department of a company to other departments, and of methods of putting standards into effect and of policing their use.

New Standards and Revisions

Among the new standards and revisions are a number of considerable interest to American industry. The Specification for Gypsum Plastering (A42.1-1938) is the first completed job of a sectional committee which was authorized in 1929 to work on a series of plastering standards which when completed will be a valuable addition to our work in the building construction field. In the paint field, 11 standards providing specifications and methods of test for various pigments were approved, supplementing 10 pigment standards and 2 turpentine standards approved during the preceding year. In the petroleum industry, the customary annual action on methods of testing to maintain petroleum standards current with technical developments led to the approval of revisions of five existing standards and the withdrawal of approval of two others.

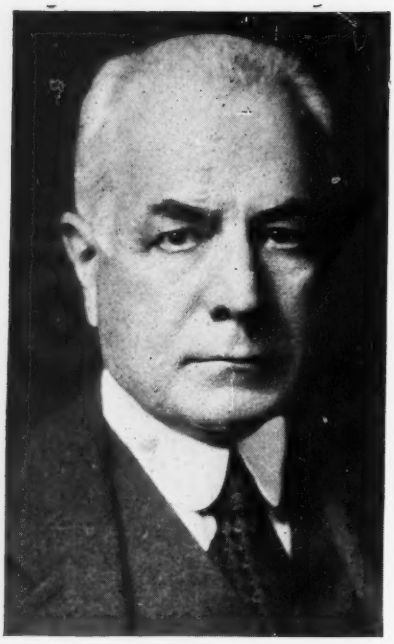
The American Recommended Practice of School Lighting (A23-1938), giving basic information on how much light and what kind of light is needed for the various daily tasks of our children, has received widespread recognition.

Correlating Committees

The industry supervising or correlating committees which supervise standardization matters in their respective fields have also been active.

The *Electrical Standards Committee* has during the year recommended the approval of 14 standards, all of which were acted upon favorably by the Council. Two of these standards are in the field of insulated wires and cables; and they complete the original program of the committee initiated in 1921 and which has resulted in a total of 18 specifications to date.

Another new specification approved during the year



George B. Cortelyou

Past-Chairman of the ASA Advisory Committee; Former U. S. Postmaster-General, Secretary of the Treasury, and Secretary of Commerce; who has just been elected first Honorary Member of the American Standards Association in appreciation of his long-standing interest in the national standardization movement.

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deals with indicating electrical instruments in a new way and has been well received by industry.

During the coming year the Electrical Standards Committee expects to submit to the Council several new standards. Among them are Specifications for Transformers, Regulators and Reactors; Test Code for Transformers, Regulators and Reactors; and Guide for the Operation of Transformers. It is also expected that a compilation of definitions of more than six thousand terms in the electrical field, which has been under way since 1928 under the sponsorship of the American Institute of Electrical Engineers, will be ready for submittal to the Council.

A considerable part of the work during the year of the sectional committees under the supervision of the Electrical Standards Committee has been occasioned by the plenary meeting of the International Electrotechnical Commission held in June, 1938, in Torquay, England—a rather complete report of which was submitted at the September meeting of the Council. These sectional committees serve as advisory groups to the U. S. National Committee of the I.E.C., the personnel of which, it will be recalled, is identical with that of the Electrical Standards Committee, plus three representatives from the A.S.M.E. and eight members-at-large.

The *Mechanical Standards Committee* presented to and had approved by the Council two standards during the year.

Of work under the *Mining Standardization Correlating Committee* two standards and one revision were approved. A critical review is now being made up of the projects and standards in the mining field. It is expected that recommendations with respect to the conduct of some of this work will be made early in the coming year.

The greater part of the work of the *Safety Code Correlating Committee* during the year 1938 has been in connection with passing upon standards which have been submitted to the ASA for approval. Four new standards and four revisions of existing standards were approved by the Council.

The growing importance of safety work as a whole is indicated by two actions taken by this Committee during the year. The first was the transfer of certain projects from the jurisdiction of the Safety Code Correlating Committee to other correlating committees. Two such projects—Building Exits Code and Safety Code for Grandstands—have been transferred to the Building Code Correlating Committee which is developing a comprehensive program pertaining to uniformity in building code requirements. Four projects concerning safety in the highway traffic field have been transferred to the newly formed correlating committee designated as the Highway Traffic Standards Committee. Even with these deductions, the Safety Code Correlating Committee still has under its supervision approximately fifty projects in the industrial safety field. All these remaining projects under its jurisdiction have been reviewed, plans have been developed for the revision of five codes, and suggestions have been made for the initiation of three new projects.

The other action of special significance is the reorganization of the Advisory Committee on Toxic Dusts and Gases into a sectional committee charged with the responsibility of developing Standard Allowable Concentrations of Toxic Dusts and Gases. Such action will allow this Committee to develop a complete standardization program in this field rather than acting only as an advisory committee to ASA technical committees.

The *Building Code Correlating Committee* continues to be very active. It held one meeting during 1938 in Washington in conjunction with the annual convention of the Building Officials' Conference of America, and its Executive Committee held three meetings. As previously indicated, the BCCC has 14 active projects under its supervision and only a few subjects customarily included in building codes remain for assignment to sectional committees, and the BCCC expects that its program will be rounded out during the coming year.

The Standards Council has authorized the organization of a new correlating committee known as the *Highway Traffic Standards Committee.* Four projects in the highway safety field, formerly under the supervision of the Safety Code Correlating Committee, have been transferred to this new division. The Committee has already held its organization meeting. The setting up of this Committee marks the first compre-

hensive effort to coordinate through standardization the activities of all the major national trade, governmental, and technical organizations in the highway field. Several members of the Committee reported on the standardization activities of their respective organizations and indicated that this work would, in the near future, be brought into the ASA for consideration as the basis of new American Standards in the highway traffic field.

Four well attended meetings were held by the ***Advisory Committee on Ultimate Consumer Goods*** during the year. Recommendations by the ACUCG for standardization projects on laundering and drycleaning processes are being studied. Studies by the ACUCG of the possibility of standard methods of test and specifications for finishing processes for textiles, particularly treatments to render fabrics and garments more resistant to insect attack and to water, have been coordinated with a similar program in A.S.T.M. Committee D-13 on Textile Materials. A subcommittee investigation of the present system of grading standards used in marketing of silverplated tableware has indicated that consumers are likely to be much confused; and the ACUCG is hopeful that recommendations looking toward a program of national standardization under ASA auspices may be worked out during the next few months.

Board of Examination

Since the Annual Meeting of 1937, the Board has acted on 24 cases referred to it by the Council for recommended action. These cases include, in addition to standards submitted for approval, proposed new projects, proposed scopes and personnels of new sectional committees and withdrawals of approved standards.

International Work

The American Standards Association is actively participating in 17 international standardization projects under the ***International Standards Association.*** One of these, Documentation, is new this past year. The Association will probably also cooperate in the newly established ISA project on Welding and Welding Apparatus. A series of meetings, some of them of considerable importance to American industry, were held in Berlin last June. You may remember that a report of these appeared in the October issue of INDUSTRIAL STANDARDIZATION.

Mr. Agnew has been appointed to represent American industry on the Council of the ISA.

The ***International Electrotechnical Commission*** held a plenary meeting in England in June. The United States National Committee which is affiliated with the ASA through the Electrical Standards Committee was well represented. Considerable progress was made in a number of the many projects which are under way and in which this country takes an active part. A report of this meeting was published in the August issue of INDUSTRIAL STANDARDIZATION.

Eight New Committees Authorized by ASA

New committees, authorized during the past year, will work on standards for:

Specifications for accident prevention signs
Bedding and upholstery
Allowable concentrations of toxic dusts and gases
Building code requirements for minimum design loads in buildings
Building code requirements for reinforced gypsum concrete
Photography
Building code requirements for signs and billboards
Building code requirements for wood

All organizations directly concerned with the standardization problems to be taken up by each committee are being invited to name representatives to help develop standards on these subjects.

Correlating committees supervise the Association's work in the electrical, mechanical, mining, building, safety, highway, and consumer goods fields, and help to prevent duplication of effort or conflict in standards provisions.

The Standards Council held its usual scheduled meetings in addition to the December Annual Meeting in April and September. The establishment in 1936 of industry supervising groups or sub-councils made it possible for the Council to deal by mail with much of the routine work involved in passing on recommendations placed before it, so that three meetings during the year instead of four are proving sufficient for the proper conduct of the Council's regular business.

The personel of the Council has been increased by the addition of two members representing two new member bodies, making the present membership 64 representing 38 member bodies. We have suffered a serious loss through the death of John A. Capp, a past-officer and a member of the Council representing the American Society for Testing Materials continuously since the organization of

the predecessor American Engineering Standards Committee in 1918. He had always been an active participant in the work of the Council, contributing wise advice which did much to establish and maintain the principles upon which the success of the American Standards Association is based.

In conclusion, it is believed that the Council organization is functioning satisfactorily, and that it has again been made evident that, despite an occasional conflict of interest which sometimes appears to retard the progress of a particular project because of other than valid or technical reasons, the ASA method of arriving at truly national standards is being ever more widely accepted. This fact, together with the increasing prestige of ASA approval, justifies industry support of a system under which the interests concerned with a proposed standard, and only those interests, determine that standard.

Management and the Public

by

William L. Batt

President, SKF Industries
Philadelphia

Standardization, applied by American management to an extent unknown in other countries, has already been responsible for our high standards of living. Further application of standardization principles leading to coordination not only in industry itself, but also between industry, agriculture, labor, and government may be the solution to the demands now being made for more goods for more people, higher wages, shorter hours, and a better living for all, says Mr. Batt.

IF I have any function here today it is to indicate that management in industry everywhere recognizes the debt it owes to the pioneers in this great movement of standardization. I feel most humble discussing a question of this nature before men who are so obviously authorities on it and particularly when I am privileged to sit at the same table with Mr. Cortelyou. Aside from his national reputation, Mr. Cortelyou has apparently been father, mother, and nurse to this now fully grown child.

To these men who were active in the organization of the national standardization activities industry owes a very large debt.

It is interesting that this organization, the American Standards Association, took its present form in a time of great national emergency.

During the war, in 1917 and 1918, production in this country in both goods and services was larger than it has been at any period since. When we recall that standardization and the results of standardization had a large part in industry's outstanding performance during that period, we must conclude that the need for standards is greater in times of emergency than it is in times when things are proceeding at a normal pace. We may consider the present a time of similar emergency, not because of the rumor of war—but because we are in the midst of a period in which the country is asking more of management than it has ever asked before. New and increasing demands are being made—that management shall accomplish seemingly impossible things: that it shall assume the duty of providing more jobs for more people;

William L. Batt

As president of the International Committee of Scientific Management, which includes in its membership the national committees of 17 countries, as well as president of SKF Industries, Mr. Batt has an intimate knowledge of management's problems. He is chairman of the Resolutions Committee of the National Association of Manufacturers; has been active in the work of the Society of Automotive Engineers; and was president of the American Society of Mechanical Engineers in 1936.

He has been decorated twice by the King of Sweden for his interest and activity in promoting commercial relations between that country and ours.

that it shall find new aids to provide a better living for all of us; new means of paying higher wages; new means of producing the necessary things of life for more people in shorter hours; means of regularizing the year's work; of increasing the year's pay as distinct from the hourly pay; means of providing new security for employees engaged in industry. I could go on indefinitely, but I must not leave out this one particular demand—that management produce more goods at lower prices and thus enable a larger cross section of the people of the country to buy.

These demands are not made easier by the increasing intervention of government, which through legislation, executive opinion, and executive action has so operated as to substantially lessen the area of private enterprise and to discourage the initiative which has been so typical of American management over the years. We must recognize, I think, that the inevitable effect of the increasing control of government has been to increase the fear of capital of venturing into new areas. I need only say that in my opinion one of the outstanding difficulties of the day is the fear of capital to venture into business, not because there is not an abundance of capital available, not entirely because capital itself is not willing to venture, but because we in business cannot satisfy ourselves that we are warranted in borrowing that capital.

The growing demands of the public on the one hand, and the increase of government restrictions on the other have made management's job more difficult than it has ever been before.

As we find ourselves under such pressure from two different directions, management looks about to see where and in what way it can bring about the results requested of it by the public. Certainly we must find new methods to do each day's work more efficiently if we are to produce more commodities at lower prices. If we are to give more employment and provide a higher scale of living, we must find methods we do not now have, or we must utilize present methods more fully than we utilize them today.

One of the outstanding aids to management in its search for these more efficient methods is certainly the contribution of standardization. Of all the characteristics of American management, it seems to me that the application of the principles of standardization is most outstanding. I do not think we have been particularly outstanding in our handling of labor problems. We have, in some respects, shown the way in the development of machinery; but it can be said without fear of contradiction that in utilization of the principles of standardization we have led the world. We have applied those principles to an extent that they have never been applied elsewhere.

An increased use of standardization may be our solution today. Undoubtedly, the one thing on which we all agree is that its use has contributed more than any other thing to the high standards of living in this country which we now have, standards which are higher than those in any other part of the world.

As a member of long standing of the Society of Automotive Engineers it is perhaps excusable if I lay particular emphasis on the use of the standardization principle as an essential part in

the building up of the automotive industry. If there is any one industry in the U. S. which has used standardization it has certainly been the automotive industry. It seems only yesterday that that dramatic competition for the Dewar Trophy took place in London. That was the occasion when three Cadillac cars were to compete for the very large sum of money offered by Lord Dewar for the automobile which should first be completely assembled from stock parts. To us today this would be an ordinary occurrence and we would not give it much thought. But 25 years ago it was a triumph when the Cadillac Company, first of all companies in the world, proved that it could assemble one complete car in good running condition out of the disassembled parts of several cars.

Saves $800,000,000

The use of this principle in the component parts of automobiles has greatly contributed to the growth of the automotive industry in the United States. Figures show that in one year's output of American automobiles over eight hundred million dollars was saved for the manufacturers, and of course in cost to the public, because of the large number of minor parts that have been standardized. If you have never driven a European automobile in America, you cannot fully appreciate the beauties of standardization. But just get out on the open road and have something go wrong with a European machine—it doesn't matter much what it is. What to most motorists in America is only an annoyance becomes a tragic happening when you are driving an automobile whose parts are not available in all parts of the country. We get so accustomed to the conveniences of standardization that we fail to recognize their significance.

Another thing which impresses me is the standardization of bolts and nuts. One company paying $60 per hundred for a certain type of bolt was able to purchase the same thing for $9 after standardization. As one listens to Mr. Farmer's report one is conscious of the fact that these illustrations of the dollars and cents savings resulting from standardization could be multiplied by the hundredfold.

The other day a friend of mine, head of one of the largest companies producing aircraft engines, was discussing how much of a problem it would be to bring aircraft production of this country up to that of other countries. He told me that no other country makes aircraft engines of interchangeable parts as we do in the United States. Every time the foreign plane needs overhauling it must be brought back to the factory of its origin, while in the United States we overhaul an engine any place where there are adequate facilities for the job. Some time ago when the drawings of American engines were put before European manufacturers and production engineers and they saw the close tolerances and the requirement that the engine should be susceptible of rebuilding in the field, they threw up their hands and said it could not be done. The obvious answer to that is that it can be done and we are doing it. That, it seems to me, is the answer to the building of aircraft engines for defense in the United States.

Without standardization we could never have had the rapid growth in the aircraft and automobile industries which we have seen. This is just as true of the manufacture of other articles too numerous to mention. Our life is built around the principles of standardization which have become so commonplace to us that we do not know what life is like without them. Louis Johnson, Assistant Secretary of War, said recently: "The adoption of standards is a highly important factor in this country in preparedness for national defense. The value of the work of your association in developing and establishing standards in industry is thoroughly appreciated."

This same idea has also been expressed by one of the outstanding industrial leaders of the country, Charles F. Kettering, vice-president of General Motors. "Lack of coordinated functioning within industries, and between industries is one major cause of business fluctuations," he said. "The national standardization movement is making a definite forward step toward the correction of this situation."

Demand for Coordination

I myself am quite satisfied that the great demand before American industry today is the demand for increased coordination, for coordination not only between men within industry itself but also for coordination with agriculture, with labor, and with a sympathetic government. Coordination is not practicable in a country in which the principles of standardization are not accepted and practiced. As I compare the situation of today with that of 20 years ago, it seems to me that the forces which made standardization an imperative demand in that time of national emergency are just as effective today in enabling management to meet a different type of problem but one whose significance is of similar magnitude. It is the task of management to solve the problem placed upon its shoulders, unreasonably perhaps, but nevertheless placed there. If we fail to find that solution, the alternative which we may face is that alternative which we have seen the peoples of other countries forced to accept when they have failed to find such a solution within their existing economic systems.

This is management's problem. It is not the

problem of the chief engineer, or the purchasing agent, or the production manager. We will all agree that any chief engineer, any production manager, any purchasing agent, will recognize the value to him of being able to work with, or design, or buy articles which are interchangeable. The reasons are so obvious that I need not repeat them. But without the support, without the day-by-day active interest of top management they will inevitably fail in the effective use of standardization.

Industry is grateful for the work of an organization like the American Standards Association. It is not particularly dramatic. There is nothing about this standardization work which lends itself to flag waving. You have no gay uniforms, nothing to bring you into the eye of the public in any flattering way. Your satisfaction must come from the knowledge of work well done. Management is making increasing demands of you for the solution of its problems. You have the same right to insist that management support and cooperate in your work. I hope you will be increasingly successful in pushing forward your aims.

Motor Vehicle Administrators Urge Use of American Standard Code For Safety Glass

A resolution recommending the use of the American Standard for safety glass by all motor vehicle administrators was adopted at the Sixth Annual Convention of the American Association of Motor Vehicle Administrators at Detroit, October 7. The resolution reads:

WHEREAS, The Engineering Committee of the American Association of Motor Vehicle Administrators has recently noted certain aspects of the safety glass situation which prompts your committee to again bring to your attention the fact that the American Standards Association has a safety glass code covering the glazing of motor vehicles.

THEREFORE, BE IT RESOLVED, That your Committee, in the interest of national uniformity, urges that no jurisdiction consider the adoption of any safety glass requirements which would in any way conflict with the provisions of the ASA Code.

Electric Fences in Wisconsin To Meet Standard Requirements

Specifications for the safe use and operation of electric fences were issued recently by the Industrial Commission of Wisconsin after formal hearings and consultation with manufacturers and others concerned. The specifications require identification of the fence; and include requirements for grounding, number of controllers, allowable output, construction of the various elements used; and provisions for use in order that the current shall not exceed the limit permitted.

Samples of the equipment to be set up must be approved by the Industrial Commission of Wisconsin before any particular types of electric fence is permitted to be installed.

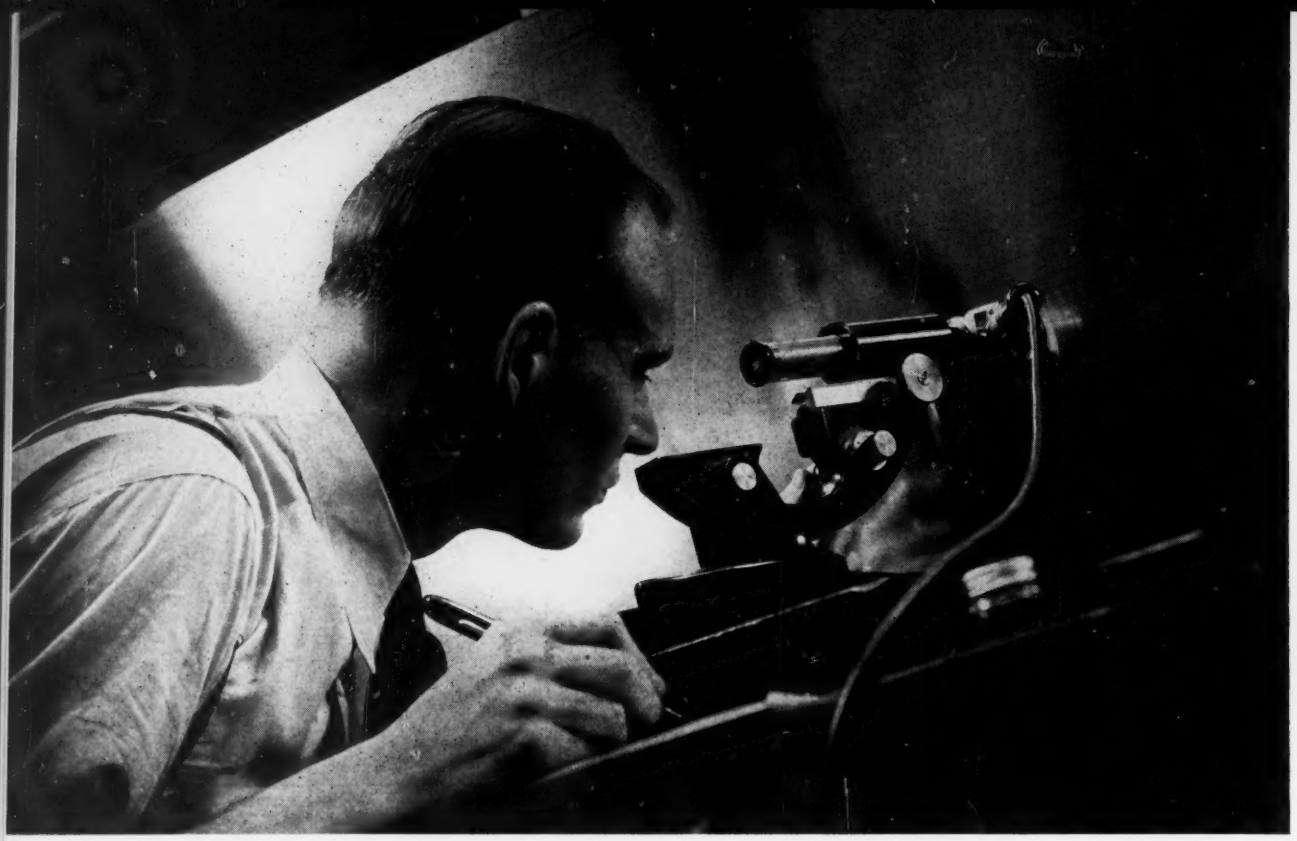
The committee which advised the Industrial Commission on the specifications to be approved consulted with a subcommittee of the National Electrical Safety Code before making its recommendations.

Howard Coonley

Coonley Elected To Head NAM

Howard Coonley, chairman of the board of the Walworth Company, and chairman of the Advisory Committee and past-president of the American Standards Association, was elected president of the National Association of Manufacturers at its meeting in New York, December 6-8.

Mr. Coonley succeeds Charles R. Hook, president of the American Rolling Mill Company, who was chosen chairman of the association's board of directors.



Inspecting minute "hills and valleys" of the surface to determine its smoothness—an important factor in finishing the "horseshoe" bearing of the mounting for the 200-inch Mt. Palomar telescope. Dr. Way's article describes the methods he uses in measuring surface quality. A transparent plastic model of the telescope mounting is shown on our front cover.

Surface Quality Measurement in Practice

How surface irregularities in the "horseshoe" of the 200-inch Mt. Palomar telescope were measured by Westinghouse engineers

by

Stewart Way

Research Engineer, Westinghouse Electric & Manufacturing Company

ASSOCIATED with every machine part is an ideal surface and an actual surface. The ideal surface is the geometrical boundary of the piece defined by the design, when tolerances are reduced to zero. The actual surface is something that in a final analysis has no precise meaning, but which can be defined in a satisfactory way for engineering considerations as that surface of the body which would be indicated by the most accurate gauging methods at our disposal.

Conventional gauging methods usually involve bringing the surfaces of gauging tools into contact with the actual surface at certain points. Such methods, of course, can give no information about irregularities whose dimensions are small as compared to the dimensions of the contact region with the gauge. To secure detailed information about the shape of the actual surface of a body special tools have been developed that

may be called instruments for measuring surface roughness[1].

The devices for measuring surface roughness may be divided into two classes, those which give a complete picture of the profile over a certain small length and those which give a single parameter associated with roughness. In the latter group we find instruments which give the average departure of the actual surface from a reference surface, or instruments which give the root mean square value of this departure. The devices which give a complete picture of the profile are usually of one of two types—needle tracer instruments or optical instruments.

Instruments using the needle tracing method[2] employ a fine pointed member which is drawn across the surface. The vertical motions of this member are magnified mechanically or optically and recorded. The accuracy of the profile map so obtained is limited by the finite radius of the tracer point and the amount of tearing of the surface caused by the point. Also, sufficient pres-

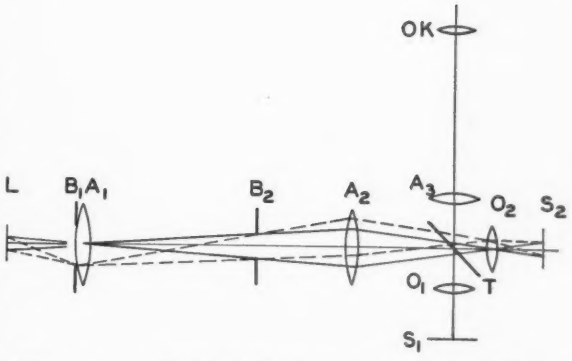


Fig. 1 — *Optical System of Linnik Micro-Interferometer*

A_1, A_2, A_3 Achromats; B_1, B_2 circular apertures; L light source; O_1, O_2 microscope objectives; OK ocular; S_1 object; S_2 mirror; T partially reflecting plate

[1]Many such tools are described in the book by G. Schmaltz, "Technishe Oberflachenkunde." J. Springer, Berlin, 1936. (Reviewed in INDUSTRIAL STANDARDIZATION, Sept., 1937.)

[2]E. J. Abbott and F. A. Firestone, *Automotive Industries*, Aug. 19, 1933, p 204. See also Kiesewetter thesis, Dresden, 1931.

By the Associated Press

Pittsburgh, July 23.—The greatest steel-polishing job ever undertaken, to insure accurate pointing of the 200-inch eye of the world's greatest telescope to be set up on Mt. Palomar, Calif., is finished.

The task was to polish the rim of the huge steel horseshoe, to the axle of which the telescope will be fastened. The horseshoe will swing to focus the 200-inch glass "eye," still being ground at Pasadena.

The arc of the horseshoe rim, by the polishing, was made to conform within 5-1,000ths of an inch to a perfect circle, it was announced today by the Westinghouse Electric and Manufacturing Company. The polishing was done in a special mill at East Pittsburgh.

The horseshoe is four stories high. It was shipped here in three sections, each filling a flat car. Its sections bolted together, it was set turning in the polishing mill. It moved past rotating grinding tools for 131 days. More than two tons of the steel surface was ground away.

The sun almost ruined the job. Although the polishing was started under a roof, the heat from the sun warped the steel rim from hour to hour. Even as small a change in temperature as 10 degrees distorted the ends of the horseshoe 13-1,000ths of an inch and the center 7-1,000ths of an inch.

Blue paint was tried on the skylight of the grinding mill. This was not enough. Work was almost at a standstill for days while engineers made a special umbrella of heat-resisting composition. This cut the heat-expansion by 50 per cent.

After the circle was apparently perfect, Dr. Stewart Way, research engineer, went over its surface with a microscope. He found "hills and valleys" a few thousandths of an inch in dimension. These were marked and polished off as the final step.

The horseshoe weighs 150 tons. It will carry a weight of about 30 tons. Its polished surface will turn on pads carrying oil at pressures above 200 pounds to the square inch.

According to the astronomer specifications, the perfection of the horseshoe rim will enable the "eye" to be pointed so accurately that the error in direction will not exceed the angle made by drawing two lines from opposite edges of a quarter to a point three miles away.—***From the New York Times.***

Fig. 2 — *Interference photomicrograph at 410 X Fringe protrusions about ½ fringe interval indicating scratches of depth about 0.14μ*

sure must be applied to the tracer to insure that it follows the irregularities. The use of a fine point and a finite pressure, which is desirable, makes it difficult to avoid tearing the surface. In spite of these difficulties very good results have been obtained with this type of instrument.

The optical instruments that have been devised for the purpose of giving complete information about the microgeometry of surfaces are more recent developments than the needle-tracer instruments. One such device is the micro-interferometer, designed by Linnik[3].

The micro-interferometer gives a contour map of a small region of the surface. It is a simple matter to construct a profile map from the contour map graphically. The most important usage of the micro-interferometer is not in providing profile maps in this manner, however, but in furnishing an estimate of the depth of exceedingly fine scratches. Polishing scratches one or two millionths of an inch deep can be measured with this instrument. The optical system of the micro-interferometer is shown in Fig. 1. The observed surface is placed at S_1 beneath achromatic objective O_1. A mirror is placed at S_2 in the focal plane of objective O_2, which is identical with O_1. Achromats O_1 and O_2 are connected for infinite tube length. The glass plate T is a partially reflecting surface. If surface S_1 were perfectly flat, no interference of the light reflected from it with that reflected from S_2 would be obtained. Since S_1 is not perfectly flat interference fringes are produced corresponding to differences in elevation of S_1 of magnitude $\frac{\lambda}{2}$, λ being the wave length of the light used. By tilting S_1 slightly the number of fringes in the field is increased. A typical photomicrograph made with the Linnik interferometer is shown in Fig. 2. A convenient light source is the mercury green line for which $\lambda = 0.546$ microns. The scratches on the surface in Fig. 2 cause the dark area to extend about half way from one fringe to the next, so that the depth

[3]C. R. Acad. Sci. U.S.S.R. 1933, p 21. See also W. Kinder, Zeiss Nachrichten, Heft 3, Aug., 1937, p 91.

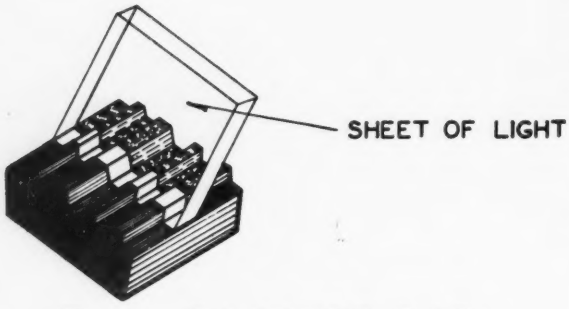
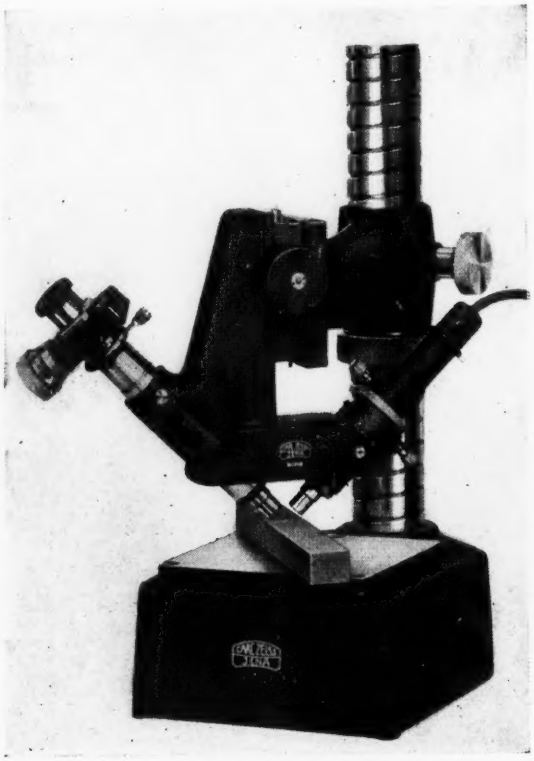


Fig. 3 — *Principle of Optical Cut*

Fig. 4 — *Surface finish indicating microscope of Schmaltz type*



may be estimated to be $\lambda/4$ or 0.14 microns (0.000006 in.) The micro-interferometer is thus seen to be a very powerful tool for the estimation of the depth of individual minute scratches. Its use is limited, however, to surfaces of good reflectivity.

Another optical instrument which furnishes information about the surface profile is a surface measuring microscope developed by Schmaltz[4]. This device gives a complete picture of the profile over a certain length. The underlying principle is that of the optical cut, pictured in Fig. 3. To produce the sheet of light Schmaltz used a microscope objective projecting on the sample the image of a small illuminated slit. Instruments are made by Zeiss, as illustrated in Fig. 4, utilizing the Schmaltz principle.

A variation of the Schmaltz scheme has been used by the writer with some success[5]. A straight edge having a length about equal to the diameter of the field of the microscope is placed in contact with the surface, and is illuminated at a 60 deg angle as shown in Fig. 5. The shadow of the straight edge is then viewed with a microscope at an angle of 60 deg to the surface and 60 deg with the illuminating beam. The observed shape of the shadow is the true shape of the surface profile, on a plane through the straight edge perpendicular to the surface. This procedure might be called the straight edge shadow method of studying surface finish.

[4]G. Schmaltz. See reference 1, also Zeiss booklet Fe. 182.

[5]S. Way, Mechanical Engineering, Nov., 1937.

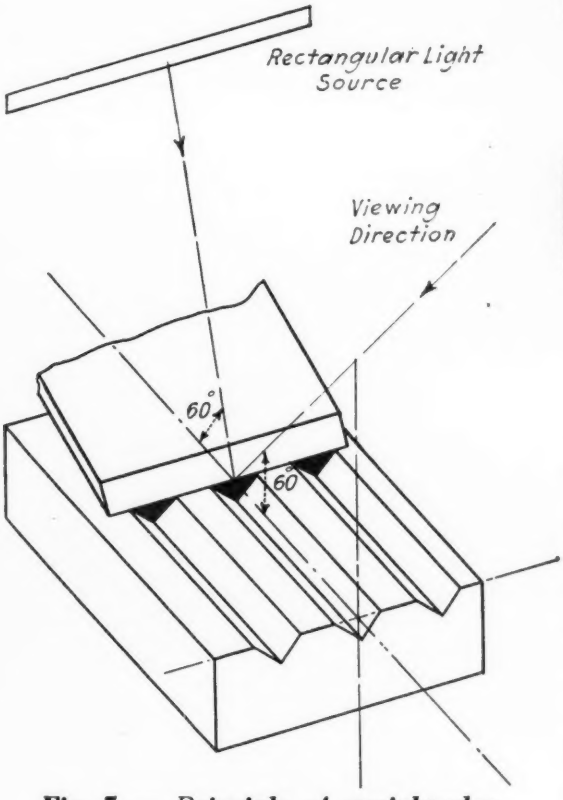


Fig. 5 — *Principle of straight-edge shadow method*

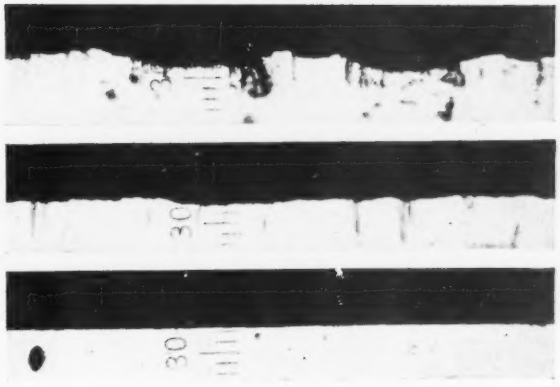


Fig. 6
(*a*) ***above*** **— Turned**
(*b*) ***center*** **— Ground**
(*c*) ***below*** **— Polished**
300 X

Fig. 7 — Gear Teeth
(*a*) ***above*** **— Hobbed**
(*b*) ***below*** **— Ground**
300 X

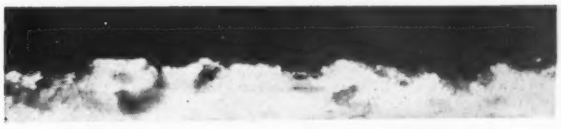


Fig. 8 — Coarsely Lapped Surface
300 X

Three finish photographs made by the straight edge shadow method of turned, ground, and polished surfaces are shown in Fig. 6. Each small scale division is 0.0002 in.

The straight-edge shadow method has been applied to several practical problems which may be of interest.

In connection with gear tests, the problem of

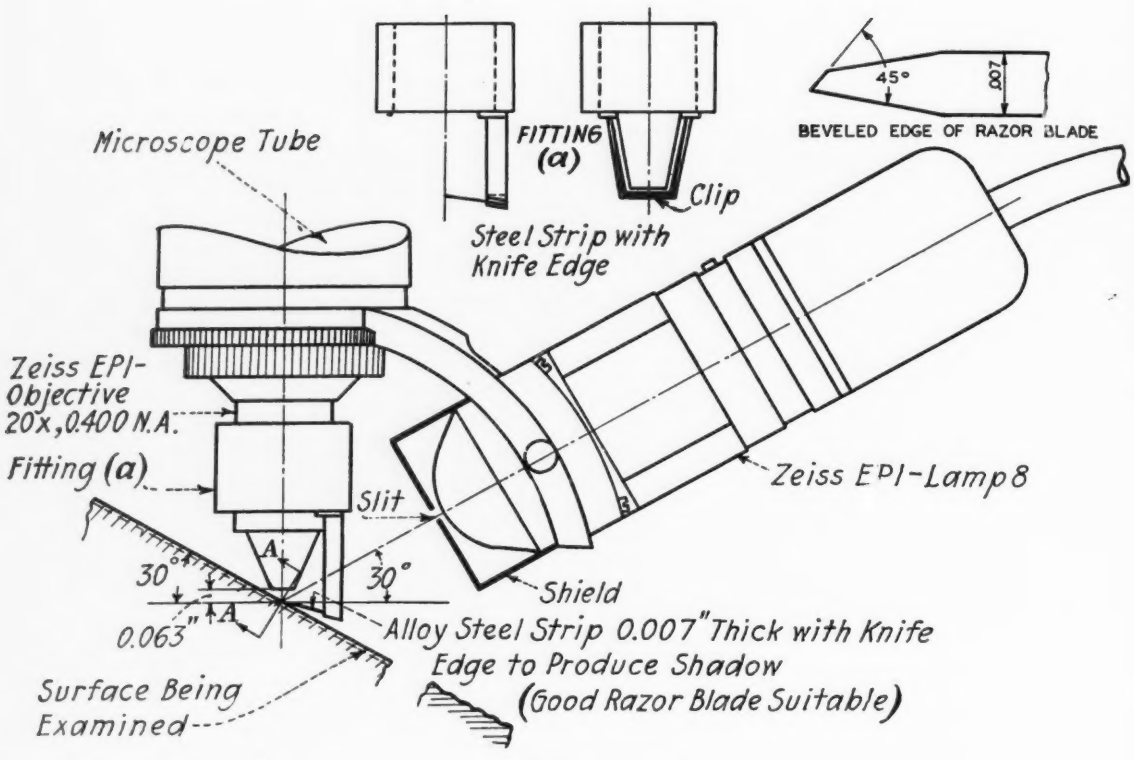


Fig. 9

evaluating the surface finish of the teeth arose. On gear teeth the finish marks run perpendicular to the plane of maximum profile curvature. When the straight edge is placed against the tooth surface perpendicular to the scratches, it is therefore in contact with the surface only at its mid-point. This does not make the method inapplicable, however, as the length of the straight edge is very small compared to the radius of curvature of the tooth. The surface profile of a hobbed gear tooth is shown in Fig. 7, and with it, for comparison, the surface of a ground tooth is shown. Both are at 300 times magnification.

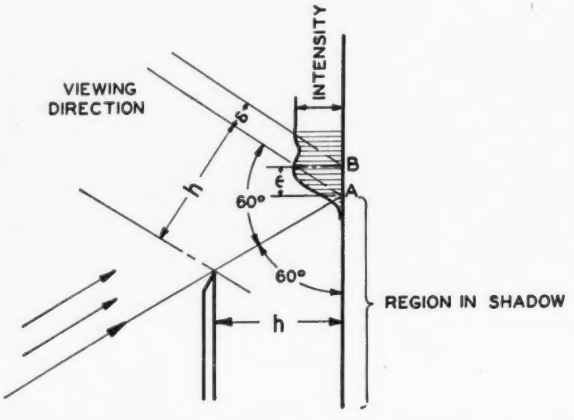
Another application of this method of finish observation had to do with the study of the roughness of lapped surfaces. When two metal pieces are lapped together with a very coarse lapping compound the finish is as shown in Fig. 8.

The straight-edge shadow method was also applied to the study of the depth of grinding scratches and other irregularities during the course of grinding the north polar axis bearing, or "horseshoe," for the 200 in. Mt. Palomar telescope. In this way the seriousness of the irregularities could be ascertained, and the amount of further grinding necessary to remove them determined.

The straight-edge shadow method is seen to provide a simple and convenient means of evaluating surface finish in the shop as well as the laboratory.

The equipment used by the writer comprised a Zeiss achromat 8 times of 0.200 numerical

Fig. 10 — *Diffraction at straight edge*



aperture, a Zeiss epi-achromat 20 times of 0.400 numerical aperture, a Zeiss epi-lamp No. 8 and 8 volt source of current, and a small fitting supporting the straight edge which is slipped over the end of the objective. The epi-objective is especially convenient because of its conical end, permitting passage of the illuminating beam. The apparatus is arranged as shown in Fig. 9. For a straight edge, a short section of safety razor blade can be used. The blade should first be beveled by polishing with 4/0 emery paper in a direction parallel to the edge. Beveling the edge to 45 deg as shown in Fig. 9 makes it much more durable than the original edge. The edge should be free from observable notches at 400 times magnification, a requirement that is not difficult to realize.

The accuracy of the straight-edge shadow method will be determined by the resolving power of the microscope and the diffraction that takes place as the light passes the straight edge.

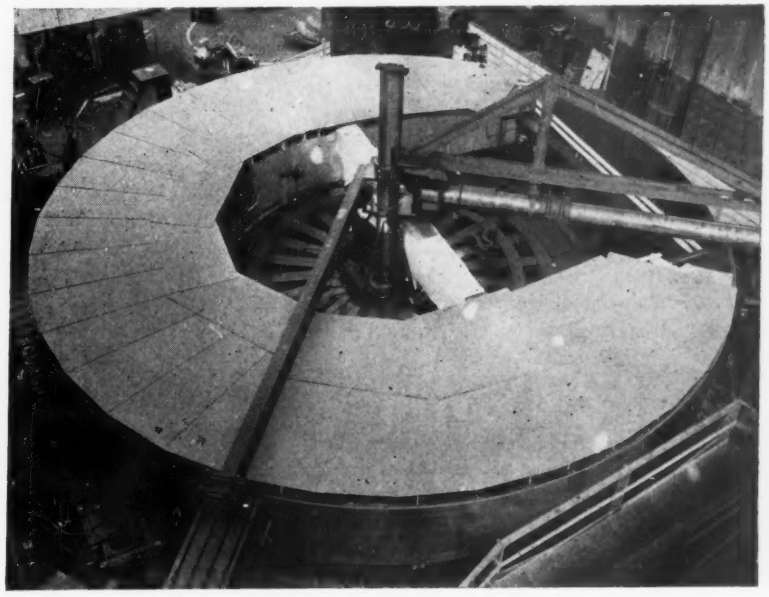
The resolving power of a microscope is measured by its ability to produce separate images of two object points very close together. The distance of separation of two object points which can barely be distinguished as separate will depend on the type of illumination and the numerical aperture of the objective. With ideal illumination, such that the full aperture of the objective is completely filled with light, the resolving power is $\lambda/2$n.a. With a 0.400 numerical aperture objective, therefore, and green light, the resolving power is 0.68 microns, or 0.000027 in. Hence an uncertainty of 0.000027 in. arises in the observation of the edge of the shadow of the straight edge, due to the limited resolving power of the microscope. This is the case for 0.400 n.a. An objective of larger numerical aperture could be used, such as 0.650 n.a. and in this case, the uncertainty of location of the edge of the shadow arising from limited resolving power would be only 0.000017 in. The working distance of such an objective would be only 0.021 in., however, and the problem of placing and illuminating the straight edge is not easy, although it can be done.

The other source of uncertainty in the observations arises from diffraction as the light passes the straight edge. Suppose we place a straight edge in a field of parallel light rays, and observe the shadow of the edge on a plane surface at dis-

ASA Committee Considers Standards for Surface Quality

The problem of determining the quality of a surface and of classifying surfaces on the basis of their quality has been under consideration for several years by a technical committee of the American Standards Association. J. R. Weaver, director of equipment inspection and test, Westinghouse Electric & Manufacturing Company, is chairman.

A draft of a proposed American Standard on Surface Roughness has been widely circulated by this committee for comment.



The bearing of the 200-inch telescope, 56 feet in diameter, will carry the four-story-high tube which will house the 200-inch reflecting mirror, auxiliary mirrors, and the observer's compartment. It must turn smoothly, easily, and with great accuracy. The finished surface of the bearing was tested for smoothness by Dr. Way by the method described in this article.

tance h from the edge. Let the rays meet the surface at an angle of 60 deg. The intensity of illumination will be found to vary qualitatively as shown in Fig. 10. Maximum illumination will not occur immediately at the geometrical edge, A of the shadow, but at B a distance ε from A. If the surface is viewed at an angle of 60 deg, ε will be projected as a length δ. The magnitude of δ will depend on the wave length of the light and on h, according to the relation $\delta = \sqrt{h\,\lambda/\sqrt{3}}$. There will thus be an uncertainty δ in the location of the edge of the shadow resulting from interference phenomena as the light passes the straight edge. Now h corresponds to the depth of the irregularities being measured. As h decreases δ/h will increase, so the uncertainty becomes larger in relation to h, the quantity we are measuring. For $h = 0.0001$ in., the value of δ is 0.000035 in. For $h = 0.00005$ in. the value of δ is 0.000025 in. Therefore, for irregularities of depth less than 0.00005 in., the uncertainty of the observed depth will be greater than half the depth.

These considerations fix a natural limit to the accuracy of the observations possible by the straight-edge shadow method of around $\pm$ 0.00001 in. Irregularities less than 0.00005 in. deep can therefore be studied only with considerable uncertainty by this method.

The Schmaltz surface finish tester, previously mentioned, is not subject to the limitation arising from diffraction at a straight edge. However, the uncertainty of observation due to limited resolving power would be the same as that for the straight-edge shadow method. In practice it has been found that with the Schmaltz instrument as built by Zeiss the roughness can be measured to an accuracy of $\pm(0.03\,H + 0.07)$ microns, where H is the maximum depth of irregularities in microns. This accuracy is somewhat better than the results obtained with the straight-edge shadow device.

ACKNOWLEDGMENT: The writer wishes to express thanks to the firm of Carl Zeiss for permission to use some figures from their publications.

German Council Protects "ISA" Mark on Products

THE letters "ISA" are to be used in connection with German products only if those products conform to the recommendations of the International Standards Association, the Council for Propaganda ruled in August of this year. This ruling follows the policy laid down in 1935 when the Council directed that the word "standard" or the letters "DIN" were not to be used unless the product in question conformed to the standards adopted by the German national standardizing body, the Deutscher Normenauschuss.

The ruling of the Council for Propaganda for German Economics in 1935 was based on the economic value of the word "standard" which led manufacturers to use the word both in advertisements and in designation of products in some cases where there were no approved German standards. The Council held that such use of the word was misleading to the public, and that standards other than approved German Standards should be called "Manufacturers' Standards." The article in which the Council's ruling was made public said:

"In view of the great economic importance of the German (DIN) standards in our days, manufacturers have frequently adopted the practice of designating in their public announcements, such as advertisements, leaflets for propaganda purposes, price-lists, etc., parts worked to DIN-standards simply as 'standards', 'standardized', etc.

"In view of the great value of interchangeability of spare parts, manufacturers of half-finished products point out in their advertisements that 'standardized parts' have been used for their machines and apparatuses and that the connecting parts are 'standardized', etc.

"The great value of the word 'standard' for propaganda purposes has, however, induced some manufacturers to use the word 'standard' in public, especially in advertisements, for the designation of products for which there are no *German Standards,* but for which the manufacturers themselves have established *manufacturers' standards.* In view of the large number of German standards, the reader of such advertisement does not always know whether there are any German standards for the product in question, so that such public announcements may be at least ambiguous, and frequently misleading. In public announcements it is of chief importance which effect they have especially on the non-technical reader.

"The Council for Propaganda for German Economics therefore considers the use of the word 'standard' permissible only if the parts offered for sale conform to the standards established by the German Standards Committee (DNA) including their special technical standards. Hence a standard can be produced only by public co-operation of governmental departments, manufacturers, and users. All other products standardized by manufacturers as Manufacturer's Standards can be designated in public only as 'Manufacturer's Standards' in connection with the manufacturer's name.

"The designation of certain products by combination of names of firms, trade-marks, or invented names with the word 'standard' or the legally protected mark 'DIN' is also misleading, and it does not matter whether the word 'standard' or the mark 'DIN', or similar combinations of words or letters are used."

In ruling on the use of the letters "ISA" in August, 1938, the Council said:

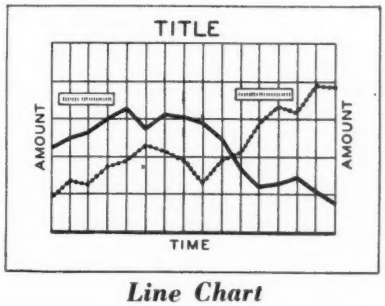
"A large part of the German standards has already been revised in accordance with ISA-Recommendations. The word 'ISA' is used to indicate the conformity of national standards with ISA-Recommendations. In the meantime, the aims of ISA, as well as the designation ISA, have become generally known to the interests. To avoid misleading the public, the word 'ISA', alone or in combination with other designations, shall be used only if the designated products conform to ISA-Recommendations."

New Standard Shows Principles For Constructing Time-Series Charts

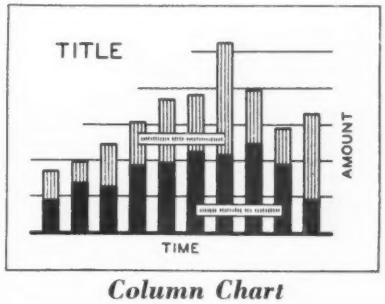
METHODS and procedures which have been found successful in constructing time-series charts have been brought together in a new standard, "Time-Series—A Manual of Design and Construction," recently approved by the American Standards Association, as an American Standard.

The manual is not a compilation of rigid rules. Effective preparation of time-series charts calls for flexibility of treatment rather than for standardization, in the opinion of the committee which prepared the standard. The committee has based its recommendations on the contention that each chart should be individually planned with reference to the special characteristics of the data and the particular use to which the chart is to be put. The

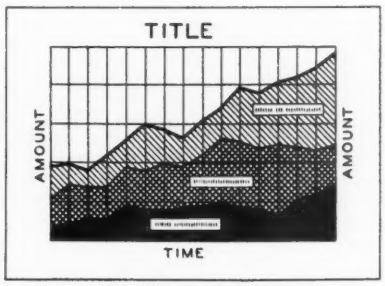
Time-Series charts are classified in this standard on the basis of graphic form or on the basis of scale arrangement. Examples of the graphic form classification are shown here.



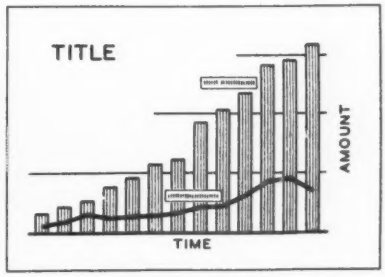
Line Chart



Column Chart



Surface Chart



Combination Column and Line Chart

Manual, therefore, emphasizes the principle that each chart should be regarded as an individual problem, its success depending upon the proper application of the basic principles of presentation. If the man preparing the chart has an intuitive grasp of these principles, his chart is likely to be successful without reference to any handbook or other source of information, but such ability, it is believed, is quite frequently lacking in those who design or construct charts. It was the conviction of the committee that the average chart maker requires fairly definite guidance in designing and constructing charts, and its recommendations were made as definite as the concept of flexibility would allow. Such factors of construction as line weights, letter sizes, grid dimensions, scale selection, curves and designations, have been covered with a considerable degree of definiteness.

While intended primarily to meet the needs of the non-expert, the Manual should serve to broaden the thinking of all who are concerned with the problem of graphic presentation. It attempts to supply at least the necessary background of experience for successful chart preparation.

The new Standard, "Time-Series Charts—A Manual of Design and Construction," was prepared by a committee representing national associations, government bureaus, and business organizations, formed in 1926 as a Sectional Committee on Standards for Graphic Presentation under the procedure of the American Standards Association. The committee, which is in effect an outgrowth of the Joint Committee on Standards for Graphic Presentation organized in 1913, is working under the administrative leadership of the American Society of Mechanical Engineers.

Copies of the new standard (Z15-1938) may be ordered from the American Standards Association or from the American Society of Mechanical Engineers at $1.25 each. ASA members are entitled to 20 per cent discount on approved American Standards ordered through the ASA office.

New ASA Project to Coordinate Building Material Dimensions

A NEW project of widespread interest to the building trades and to other groups concerned with more economical methods of building design and construction was authorized by the Standards Council of the American Standards Association at its meeting November 30.

Plans for the work, which was proposed to the American Standards Association early in the summer by Bemis Industries, include development of a basis for coordination of dimensions of building materials and equipment and the correlation of building plans and details with such dimensions. This will mean standardization of the features of design of buildings as well as of materials entering into the construction of buildings.

Bemis Industries in requesting the project pointed out that building has been a notorious laggard in the improved methods and lower costs of mass production that have generally obtained throughout industry, a proof of this being the large part of the fabrication that still has to be done on the job. What progress had been made in conventional housing, said Bemis Industries, had lain chiefly in the prefabrication of accessories and in the mass production of heating, lighting, plumbing, kitchen, and bathroom fixtures. Even here each industry had established its own standard sizes without much consistency or correlation between the various parts.

The present plan envisions a much broader standardization program which will build upon the work already done and coordinate it into a consistent set of standards for the building trades. Bemis Industries feels that the economies to be derived from widespread adoption of such standards are considerable. "Where sizes are correlated," they explained, "the parts fit together without cutting. Fabrication is transferred from the field to the shop where greater efficiency is assured. There will be less waste of materials. The number and variety of sizes will be reduced to a minimum sufficient to meet practical requirements."

To gauge the interest of the building industries in this proposal, an open meeting was held last September at which architects, builders, government bureaus interested in standardization or housing problems, prefabricators, and other groups representing manufacturers or users of building materials, heartily endorsed the project. The Standards Council was largely guided by the recommendations of this meeting.

The Standards Council of the American Standards Association authorized appointment of a technical committee representing all groups that have an interest in the project, with the further recommendation that this committee work under the joint leadership of the American Institute of Architects and the Producers' Council.

ASA Electrical Committees Report Progress in 1938

THE 37 committees working under the supervision of the Electrical Standards Committee report that a great deal of work leading to the development of standards has been done during the past year, not only on standards for approval by the American Standards Association but also in advising the United States National Committee of the International Electrotechnical Commission on problems connected with international electrical standardization.

Ten standards—new and revisions—were approved by the American Standards Association during the past year on recommendation of the Electrical Standards Committee. The new standard on electrical indicating instruments covers these widely used devices in a new way. Two standards for wire and wire coverings bring the total of approved wire standards to 18.

In addition to the standards already completed and approved three important new standards are completed and are about to be submitted to the American Standards Association. They cover specifications for Transformers; Manufacturing Standards Applying to Radio Broadcasting Receivers; and Specifications for Friction Tape for General Use for Electrical Purposes.

New committees are being organized to work on storage batteries and lightning arresters and to revise the Standard Code for Electricity Meters, and the standards for industrial control apparatus. Other committees are being reorganized to bring their personnel up-to-date and to assure that they are thoroughly representative.

The activities of the 37 electrical committees which reported to the Electrical Standards Committee are shown in the following resume.

National Electrical Code (C1-1937)—This project is carried on by the Electrical Committee of the National Fire Protection Association, which was reorganized to function as a sectional committee under ASA procedure. The committee's program calls for a meeting on or about December 1, 1939, and publication of a 1940 edition of the National Electrical Code. The subcommittees working on the Code have already had numerous recommendations for editorial or technical changes in the present edition. Recommendations on these proposals and other changes are to be published during the early summer of 1939 for study by all cooperating bodies and other organizations concerned with electrical problems.

Approval of new standards and revisions, preparation of new draft standards, and cooperation in international standardization feature year's program of Electrical Standards Committee

The Electrical Committee has approved by letter ballot two proposals for tentative interim amendments of the 1937 edition. These cover certain requirements for service entrance conductors in the voltage range between 7500 and 15,000 volts listed in NFPA Bulletin 37-8, September 15, 1937; and requirements in respect to vaults for industrial substations made up of transformers filled with liquids which will not burn and metal-clad switchgear in the voltage range between 7500 and 15,000 volts listed in Bulletin 38-6, August 4, 1938.

The membership of this committee remains the same, although no representative has as yet been appointed by the International Association of Governmental Labor Officials—*National Fire Protection Association.*

National Electrical Safety Code (C2-1927)—This Code is now being revised and three meetings of the sectional committee have been held. Technical committees were organized for dealing with the principal parts of the Code, and the work is now well advanced. The revision of Part 4 has been completed and the revised text will appear soon as Handbook 34 of the National Bureau of Standards. A few important items affecting Part 2 have delayed completion of the work of revising this part of the Code, but it is hoped that the work can be completed by the end of the year.—*National Bureau of Standards.*

Code for Protection Against Lightning (C5-1937)—No change in the Code, which was revised in 1937, has been considered during the current year.

The chairman asked the committee during the year whether they considered it desirable to revise the report issued in 1929 on the protection of electrical circuits and equipment against lightning. Members of the sectional committee indicated that

they did not consider interest in the proposal sufficient to warrant revision at the present time.—*American Institute of Electrical Engineers; National Bureau of Standards.*

Terminal Markings for Electrical Apparatus (C6-1938)—A complete revision of the 1936 edition of this American Standard was recommended for adoption at a meeting of the committee in May of this year. This revision, which has been approved by the ASA Standards Council, contains terminal markings for voltage regulators, heretofore not covered. The standard has been published and is now available.—*National Electrical Manufacturers Association.*

Insulated Wires and Cables (C8)—Two new standards were approved by the American Standards Association during the year on recommendation of this committee:

Specifications for Metallic Coverings (C8.15-1938)
Specifications for Bare Concentric-Stranded Copper Cable for Insulated Conductors; Hard, Medium-Hard or Soft (C8.14-1938)

This makes a total of 18 approved wire and cable standards on ASA books and so completes the original program of the committee.

In addition, a revision of the Specifications of Impregnated Paper-Insulation (C8.10-1938) was approved.

The American Standards Association has printed the specifications as approved and they are now being issued in pamphlet form suitable for filing in a looseleaf binder. It is felt that this, combined with the completion of the general program, will go far toward making the standards more useful and so lead to their general adoption throughout the industry.

It is recognized by the committee that specifications are not static and that change is to be expected. Accordingly, each technical committee is continuing to study the specifications for which it is responsible with a view to suggesting modifications as they may appear necessary or to developing new specifications.

Among the subjects receiving active consideration are:

Specifications for Weather Resistant Saturants and Finishers for Rubber-Insulated Wire and Cable. These have been completed by the Technical Committee and were sent to letter ballot of the sectional committee on April 6. The ballot has not as yet been completed.

Heavy Wall Enameled Round Magnet Wire for which a specification is being developed to meet an apparent need in certain parts of the industry.

Springiness Test for Magnetic Wire. A need for this has been apparent for a number of years but a satisfactory test for specification purposes was not available.

During the year a new technical committee on definitions has been set up under the chairmanship of Dr. J. B. Whitehead, and the personnel of the Technical Committee on Heat Resisting Wires has been largely changed.

The sectional committee has held only one meeting during the year—the Annual Meeting on January 14, 1938.

At the Annual Meeting, new officers were elected: W. F. Davidson, chairman; G. M. Haskell, vice-chairman; W. H. Bassett, Jr., secretary. Members of the Executive Committee are: W. A. Del Mar; F. M. Farmer; R. B. Shepard; J. R. Sloan.—*W. F. Davidson, Chairman; W. H. Bassett, Jr., Secretary.*

Hard-Drawn Aluminum Conductors (C11-1927)—The only activity of this committee during the year has been in its capacity as the Advisory Group to the U. S. National Committee of the International Electrotechnical Commission on Aluminum.

During the current year a special effort was made to secure agreement on a specification for hard-drawn aluminum conductors. The adoption of such a specification has been before the committee for 15 years or more but because of a conflict of commercial interests in the various countries agreement has been difficult to obtain. At the meeting of the International Electrotechnical Commission at Torquay, England, in June of this year, the U. S. National Committee, represented by J. W. McNair, offered a compromise proposal which was unanimously adopted. With the specification for hard-drawn aluminum conductors, there was adopted a similar specification for annealed aluminum conductors. There was, however, very little debate on this latter specification.

Specifications were also adopted for the conductivity of aluminum conductors. There was, however, very little debate on this latter specification.

Specifications were also adopted for the conductivity of aluminum bus bar and for the mechanical properties of steel wire for reinforcing aluminum cable. The U. S. National Committee is still recommending against the adoption of a specification for aluminum alloy conductors, on the ground that their use has so far been so limited that an international specification is not warranted.—*American Institute of Electrical Engineers.*

Code for Electricity Meters (C12-1928)—A sectional committee to revise the Code for Electricity Meters has been organized under the joint sponsorship of the National Bureau of Standards and the Electric Light and Power Group of the American Standards Association. An organization meeting was held October 3. At this meeting the committee organized its work by electing J. Franklin Meyer of the National Bureau of Standards as chairman and H. C. Koenig of the Electrical Testing Laboratories as secretary.

Six technical subcommittees were appointed at this first meeting and these committees are now definitely at work. A meeting of subcommittee chairmen will be held as soon as the subcommittees are ready to correlate the work.—*ASA Electric Light and Power Group; National Bureau of Standards.*

Tubular Steel Poles for Electric Line Construction (C13-1926)—The sectional committee which had prepared this standard was formally discharged through a letter of August 24, 1938, addressed to all of the organizations represented. This was done because for more than ten years there had been no occasion for the committee to act and no requests for revision or for any other action had been received.—*American Transit Association.*

750-Volt Direct-Suspension Overhead Trolley Contact Construction (C15-1935)—The American Transit Association does not expect to make any changes at this time in its own specifications for overhead trolley contact construction which might lead to revisions of the American Standard, nor have requests been received from other organizations for revisions of that specification.—*American Transit Association.*

Radio (C16)—The sectional committee on radio has recently completed revisions of the American Standard for Vacuum Tube Base and Socket Dimensions (C16c-1932) and Manufacturing Standards Applying to Radio Broadcasting Receivers (C16d-1932). Work is continuing in the sectional committee on Electro-Acoustical Definitions and Loud Speaker Testing.—*Institute of Radio Engineers.*

Dry Cells and Batteries (C18-1937)—These specifications, adopted nearly two years ago, have been found satisfactory, but past experience has proved that changes in the art necessitate revisions at intervals of a few years. The sectional committee is continuing, therefore, and may initiate a revision of the specifications in 1939 or 1940.—*National Bureau of Standards.*

Industrial Control Apparatus (C19-1928)—The personnel of this sectional committee has been reviewed and the up-to-date list has been given preliminary approval by the Scope Committee of the ASA Electrical Standards Committee. Formal approval will be requested soon from the American Standards Association. Concurrently with the organization work, the NEMA group on the committee has been preparing a suggested manuscript for the new standard to be presented to the committee at its first meeting.—*American Institute of Electrical Engineers; National Electrical Manufacturers Association.*

Electric Motor Frame Dimensions (C28)—There have been no developments on this project during the past year.—*American Society of Mechanical Engineers; National Electrical Manufacturers Association.*

Insulators for Electric Power Lines (C29)—At its meeting January 28, this committee discussed the possibility of coordinating its work with that of other groups interested in insulator standardization. It decided to assign the revision of the American Standard C21a-1930 (AIEE Standard No. 41) to the Lightning and Insulator Subcommittee of the AIEE Committee on Power Transmission and Distribution, with the understanding that this AIEE subcommittee enlist the cooperation of represntatives of each of the four subdivisions authorized to work under the sectional committee. These four subdivisions are: Group 1, Pin Type Insulators; Group 2, Guy, Dead-end (except suspension type) and Rack Insulators; Group 3, Switch and Bus Insulators; and Group 4, Suspension Type Insulators. The committee's action was taken with the understanding that the work of revision will take into account any demand for inclusion of other types of insulators and other kinds of tests. There was also an understanding that the AIEE Subcommittee on Lightning and Insulators would report its work back to this sectional committee before it refers its recommended revision to the AIEE Standards Committee for action. This will make it possible to have the comments and suggestions of members of the sectional committee before the revised standard is referred to the AIEE Standards Committee for final action.

The AIEE Subcommittee to which this revision has been referred reports that the work has been broken up into several groups, each of which has been assigned to one of the subcommittee members as sponsor. Part of the revised standard is now in committee draft form. That part dealing with tests and testing procedure has been delayed, awaiting the recommendation of the insulator manufacturers who are interested in this part of the work. It is expected that within the next two months a draft of this portion of the revised standard will be available.—*J. A. Brundige, Chairman.*

Electrical Devices and Materials with Relation to Fire and Casualty Hazards (C33)—From our viewpoint the status is that no standards are now before the Association and none are scheduled for submittal.—*Underwriters' Laboratories.*

Mercury Arc Rectifiers (C34)—Conditions in the industry, as reported in June, 1938, made it inadvisable to revise the proposed standard as issued in June, 1934.—*American Institute of Electrical Engineers.*

Railway Motors and Other Rotating Electrical Machinery on Rail Cars and Locomotives (C35-1936)—The standard approved in 1936 continues to be satisfactory and the only ac-

tivity of the committee has been in connection with the work of the International Electrotechnical Commission.—*American Institute of Electrical Engineers.*

Power Switchgear (C37)—A proposed standard on Air Switches (C37.3) was considered by this sectional committee during 1938 and is being returned to the subcommittee for revision as soon as a letter ballot now in progress is completed.

Other proposed standards now being prepared by subcommittees cover:

A-c circuit breakers (previously referred to as "oil circuit breakers")
Power connectors of types used with switchgear
Metal-clad switchgear
Large air circuit breakers

Except for some changes necessary in two of the appendices, the proposed oil circuit breaker standard is now ready for submittal to the sectional committee.

One or more drafts of the last two proposed standards have been prepared, but they are still in preliminary form and have not yet been made available to the main sectional committee.

Projects which are included in the scope of this committee's work but which have not yet been started cover:

Switchgear assemblies
Network protectors
Apparatus bushings having central conductor and supporting flange, or their equivalents.

The committee decided at its meeting in January, 1934, that neither of the first two projects appeared to be urgent as compared with other tasks assigned to our committee, hence no progress has yet been made in the preparation of proposed American Standards covering these classes of equipment.

Apparatus bushings were added to the scope of the committee in May, but some delay has occurred in obtaining a suitable chairman for the subcommittee to handle this project. The organization of this subcommittee is otherwise complete. Its membership includes two representatives each from the committee on Insulators for Electric Power Lines (C29) and on Transformers (C57).

Work on the basis of current rating of fuses is awaiting agreement between the American Institute of Electrical Engineers and the National Electrical Manufacturers Association. The AIEE proposes to change the basis it uses from that previously in force, and the sectional committee cannot proceed with the preparation of a proposed American Standard until some action is taken by these organizations.

On May 9 and June 15 our Oil Circuit Breaker Subcommittee met to discuss and approve drafts of documents 17 (USA) 201 and 17 (USA) 202, respectively, for the Torquay meetings of the International Electrotechnical Commission. The minutes of that meeting are now being circulated, and our Oil Circuit Breaker Subcommittee is being asked to prepare a reply to the questions raised as the result of the meetings.—*H. R. Summerhays, Chairman.*

Electrical Measuring Instruments (C39)—The sectional committee completed its work on the American Standards for electrical indicating instruments and submitted a proposed standard which was approved by the American Standards Association on July 8, 1938. This standard has now been published and is being used. The committee feels that a year or more should elapse in order to obtain any comments which may develop through use of this standard. It will then consider these comments.

The committee has considered issuing standards for electrical recording instruments but in view of the fact that a number of new ideas were incorporated in the present standard on electrical indicating instruments it was felt desirable not to take steps on the recording instruments at the present time. This procedure is similar to that adopted by the Instruments and Measurements Committee of the AIEE several years ago when the standards for recording instruments were developed. Many of the items as well as the controlling ideas in this standard apply to both types of instruments and it is believed to be desirable, therefore, to await the comments on the present American Standards on electrical measuring instruments before work is undertaken on the recording instrument standards.

In connection with the work of this committee as an Advisory Committee to the U. S. National Committee of the IEC, drafts of the new standard on electrical indicating instruments were submitted to the IEC committee while the work was still in progress.—*E. J. Rutan, Chairman.*

Storage Batteries (C40)—This sectional committee is now being organized.—*American Institute of Electrical Engineers.*

Definitions of Electrical Terms (C42)—In spite of wide publicity given the proposed report of this committee before the formal letter ballot of the committee, many seemingly important criticisms were received immediately following the ballot. These included revisions by several subcomittees of their previously submitted report. Suggested changes are being prepared to be submitted to the sectional committee and a supplemental ballot will probably be taken.—*American Institute of Electrical Engineers.*

Overhead Trolley Line Material (C43)—This project, on which work was never actively undertaken, has been dropped by the Electrical Standards Comittee on account of lack of demand for standards covering the subject.

Rolled Threads for Screw Shells of Electric Sockets and Lamp Bases (C44)—There

is nothing definite to report in the way of progress, although the question of applying a standard to screw shells after assembly has been discussed from time to time.—*American Society of Mechanical Engineers; National Electrical Manufacturers Association.*

Rotating Electrical Machinery (C50)—Proposals for changes or additions on the American Standards for Rotating Electrical Machinery issued in 1936 are accumulating and will probably be taken up during the next year preparatory to revision.

The symposiums on ratings, insulations, and temperature limitations which the American Institute of Electrical Engineers plans to hold in January may indicate some desirable changes or additions to the standards.—*E. B. Paxton, Secretary.*

Electric Welding Apparatus (C52)—Suggestions have been received advocating a revision of the present standards, particularly with regard to resistance welding. The Committee on Scope of the Electrical Standards Committee has held a meeting with representatives of the sponsors, the chairman of the sectional committee, and others interested to consider re-organization of the project to bring about a more representative membership before proceeding with a revision of the two present American Standards.—*American Institute of Electrical Engineers; National Elecrtrical Manufacturers Association.*

Transformers, Regulators, and Reactors (C57)—The draft standards for transformers on which the sectional committee has been at work for some years have again been revised at the suggestion of the AIEE Transformer Subcommittee, and have been reduced approximately 20 per cent by eliminating material that was duplicated in the various sections. Slight modifications have been made in the Guides for Operation, and in the Test Code. The revised standards and guides for operation, and the Test Code have been sent out to the members of Committee C57, the AIEE Transformer Subcommittee, the National Electrical Manufacturers Association, and the Edison Electric Institute for final approval. It may be necessary to hold one more meeting of the committee to consider criticisms of a minor nature, but it is not expected that any major changes will be recommended. When final agreement is reached, the standard will be printed for trial use by industry during a one year period. Sufficient copies will be printed to make the standard available to all concerned.—*V. M. Montsinger, Chairman.*

Electrical Insulating Materials (C59)—This committee has continued to keep in touch with the work of the U. S. National Committee of the International Electrotechnical Commission on the projects relating to insulating oils, and shellac and synthetic resins.

The second report of the Special Committee appointed to review the situation in regard to submitting the Standard Methods of Testing Electrical Porcelain (ASTM D 116) to the ASA, recommended that these methods of test not be submitted to the ASA for approval because of the lack of interested users. This report was accepted by the sectional committee and the Special Committee was discharged.

During the year two standards were approved as the result of this committee's activities:

Methods of Testing Molded Materials Used for Electrical Insulation (C59.1-1938) American Standard
Specifications and Tests for Rubber Insulating Tape (C59.6-1938) American Tentative Standard

The following on which action was taken recently by the ASTM, are being referred to letter ballot of the sectional committee for approval before being submitted to the ASA as American Standards:

Methods of Test for Insulation Resistance of Electrical Insulating Materials (ASTM D 257-38) (as a revision to American Standard C59.3-1935)
Specifications for Rubber Insulating Tape (ASTM D 119-38) (as a revision to the American Tentative Standard C59.6-1938)

The Standard Specifications for Friction Tape for General Use for Electrical Purposes (ASTM D 69-38) have been approved by the sectional committee and will be submitted to the ASA soon. —*American Society for Testing Materials.*

Vacuum Tubes for Industrial Purposes (C60)—No meeting of this committee has been held during the past year. It had been expected that certain work in process, particularly in the Institute of Radio Engineers and the National Electrical Manufacturers Association, would have reached a stage of development far enough advanced for consideration by this committee, but since such progress did not materialize it was believed premature to attempt standardization on the same matters in the ASA. A considerable amount of information originating with the International Electrotechnical Commission and proposed by some nations for international standardization has been circulated to members of this sectional committee for consideration before the next meeting.—*Dayton Ulrey, Chairman.*

Electric and Magnetic Magnitudes and Units (C61)—This sectional committee was organized chiefly to serve as the advisory group of the U. S. National Committee of the IEC on the subject. It has been active during the past year in preparing for the meeting of the IEC Advisory Committee No. 24 which was held in June. The actions taken at this meeting were acceptable to this committee.—*J. W. McNair, Secretary.*

Lightning Arresters (C62)—The sectional committee to develop standards on lightning ar-

resters is now being reorganized. The scope of the committee's work is to be confined to international standardization.—*American Institute of Electrical Engineers.*

Radio-Electrical Coordination (C63)—The sectional committee is continuing to encourage the investigation and development of means for eliminating three non-communication tyes of interference with radio transmission and reception. Briefly, these are:

1. Radio noise interference arising largely from the operations at power frequencies of domestic and industrial electrical equipment.
2. Radio noise interference arising largely from the operation of high frequency non-communication equipment, such as electro-therapeutic devices, and the like.
3. Radio interference arising largely from non-linearities in the transmission path, such as are found in extended conductors both of electrical and non-electrical function.

In these phases of the work suitable measuring methods and equipment, as well as field data to provide suitable basis for statistical study, continue to be the important immediate objectives of the work.

Marked progress has been made during the past year in carrying out these objectives in all three fields. New and improved types of equipment and techniques for use under items 1 and 2 are fast approaching completion and may be expected to greatly accelerate the gathering of field data.

Extended study has been made of cross modulation signals arising from non-linearities in the transmission paths throughout one of the larger Pacific Coast cities, and studies of the characteristics and of the magnitude of the phenomena have been published.

In all of these studies attention is constantly directed toward the establishment of suitable definitions and nomenclature for use in publications on the subject.

One part of the committee's activities continues to be directed toward maintaining intimate contact with the work abroad in devising suitable measuring apparatus, and establishing standardized measuring methods to bring about consistent presentation and interpretation of data on this subject gathered throughout the world.—*Radio Manufacturers Association.*

Carbon Graphite and Rubber Graphite Brushes (C64)—These standards were approved in 1936. Since that time no suggestions have been received by the sponsor tending to modify them in any way.—*National Electrical Manufacturers Association.*

Power-Operated Radio Receiving Appliances (C65)—A revised edition of this standard was approved as an American Standard March 23. The provisions of the standard are being regularly applied to products submitted by manufacturers for examination, test, and listing. There are no plans at present for further revision of its text.—*Underwriters' Laboratories.*

Electrical Installations on Shipboard (C66)—This sectional committee, which is now being organized, is substantially complete and the organization meeting will be held in the next few weeks. The sectional committee will act as the Advisory Group to the U. S. National Committee of the IEC on this subject.

Soft or Annealed Copper Wire (H4-1928); Hard-Drawn Copper Wire (H14-1929); Tinned Soft or Annealed Copper Wire for Rubber Insulation (H16-1928)—Revisions on all these standards have been adopted by the American Society for Testing Materials and the revised specifications are being considered by the sectional committee for recommendation to the ASA. The standards on Soft or Annealed Copper Wire and on Tinned Soft or Annealed Copper Wire for Rubber Insulation have also been referred to the Sectional Committee on Insulated Wires and Cables (C8) to be sure that that committee approves their submittal to the ASA. As soon as these two sectional committees have approved the specifications they will be referred to the American Standards Association for approval as American Standard.—*American Society for Testing Materials.*

Bronze Trolley Wire (H22.1-1937); Copper Trolley Wire (H22.2-1937)—During the year a minor revision of these two existing American Standards was approved as American Standard in order to bring these standards more nearly in line with current practice.—*American Society for Testing Materials.*

Wood Poles (O5)—Previous annual reports have referred to plans for issuing all of the tentative specifications for wood poles as American Standards. As a first step in the carrying out of these plans, a revision of the personnel list of the sectional committee is now under way. When the revision of the committee's membership has been completed, a canvass of the members will be made to determine their views on enlarging the scope of the committee, and on modifications which may be necessary in the tentative standard specifications. —*ASA Telephone Group.*

Illuminating Engineering Nomenclature and Photometric Standards (Z7-1932)—The Illuminating Engineering Society has been carrying on a revision of this standard. The major part of the standard is also included as a section in the proposed standard Definitions of Electrical Terms (C42). Since the grouping and the numbering of terms in the definitions are intended to be permanent, it has appeared desirable to rearrange the illuminating engineering terms so as to obtain a more logical grouping than had previously been used. The same arrangement and the same num-

bers will then be used in the Illuminating Engineering Society pamphlet as are used in the more comprehensive report.

Several new sections are also being added to the report. These deal particularly with aeronautic lighting, radiation terms in general, and evaluation of ultraviolet radiation. The section on color has also been radically changed in the attempt to secure a closer approach to the practice established by the Optical Society of America, and the completion of this section has been delayed because the Optical Society's committee is considering a change in its own definitions.

While the greater part of the revision has been done, a number of detailed questions are still under discussion. It is therefore impracticable now to set a definite date for the completion of the revised report.—*Illuminating Engineering Society.*

Letter Symbols and Abbreviations for Use in Science and Engineering (Z10)—The subcommittees of this sectional committee reported progress in their work during the past year as follows:

Mathematics—The report for Mathematics is progressing but is not in final form. A 75-page draft has been circulated for consideration.

Hydraulics—As soon as final reports of subcommittees are received, a final draft of this report will be assembled.

Mechanics—A report on Symbols of Mechanics of Solid Bodies has received unanimous approval of the subcommittee and is being submitted to the sectional committee as the final report.

Structural Analysis—The third set of replies and comments on the report of this subcommittee are being tabulated and will be submitted to the subcommittee for final action. The tentative list of symbols will then be published in *Civil Engineering* for general criticism before being submitted as a final report.

Heat and Thermodynamics—The proposed symbols for heat and thermodynamics have been approved by the subcommittee. The subcommittee's report will await action by a coordinating committee which is being organized to prepare a list of Letter Symbols for Common Concepts for the guidance of all the subcommittees working under the sectional committee.

Photometry—The report of this subcommittee is nearing completion and should be ready for consideration within two months.

Aeronautics—Action by this subcommittee awaits the recommendations of the National Advisory Committee for Aeronautics, and other participating organizations.

Electrical Quantities—The letter symbols for electrical quantities are ready to be submitted to the subcommittee.

Radio—More work must be done on symbols on which there is some disagreement at present.

Physics—An extensive list of symbols on this subject has been circulated for comment.

Abbreviations—The work of this subcommittee is progressing.

Subcommittee on General Principles—A report on General Principles for Letter Symbols for Science and Technology is being sent to the subcommittee chairman with the recommendation that it be included in each final report.—*American Association for the Advancement of Science; American Institute of Electrical Engineers; American Society of Civil Engineers; American Society of Mechanical Engineers; Society for the Promotion of Engineering Education.*

Graphical Symbols (Z32)—Subcommittee 1 on Graphical Symbols for Use in Mechanical Engineering reviewed reports of its two subgroups. Changes in both the report on Graphical Symbols for Welding and on Graphical Symbols for Heating, Ventilation, Refrigeration, and Air Conditioning are being incorporated in revised drafts. Following approval by the members of the subcommittee, the revised reports will be presented to the sectional committee and industry in general.

A tentative draft on Electric Power Symbols has been reviewed by the subgroup on this subject of Subcommittee 2. After several conferences a revised draft was completed in August and copies mailed to the members of the subgroup for approval. Approval by the members of the subgroup is expected in the near future, when the report will be submitted to the members of Subcommittee 2 and industry in general.

Plans for the development of a report by Subgroup 3 on Control Symbols of Subcommittee 2 were made at a meeting in November, 1937. At that time it was the intention of the committee to hold a second meeting the following February, but it was found that the amount of work involved required the postponement of this meeting. The work thus far accomplished has been a compilation of recommended symbols. If approved by the subgroup the list will be submitted to Subcommittee 2.

Subgroup 4 on Communication Symbols of Subcommittee 2 completed a draft of the proposed American Standard for Graphical Symbols for Telephone, Telegraph and Radio Use, dated April 1, 1938.

Subgroup 6 on Architectural Symbols of Subcommittee 2 has carried on an extensive correspondence among its members during the past year concerning the revision of a tentative list of architectural symbols prepared in 1936. Agreement on the changes and additions to be made in this earlier list is expected soon, so that it can be submitted to the members of Subcommittee 2 for approval.—*American Institute of Electrical Engineers; American Society of Mechanical Engineers.*